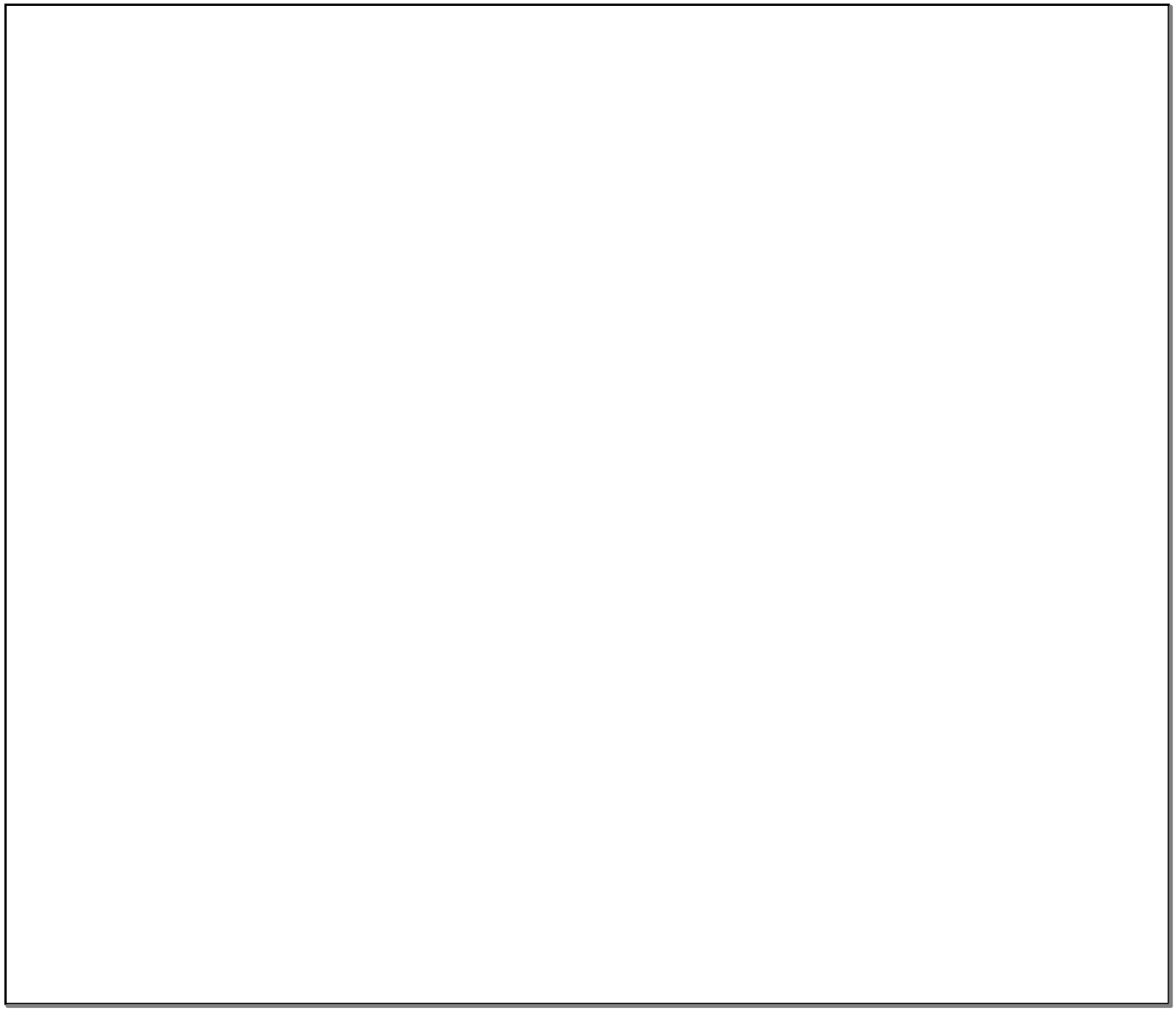
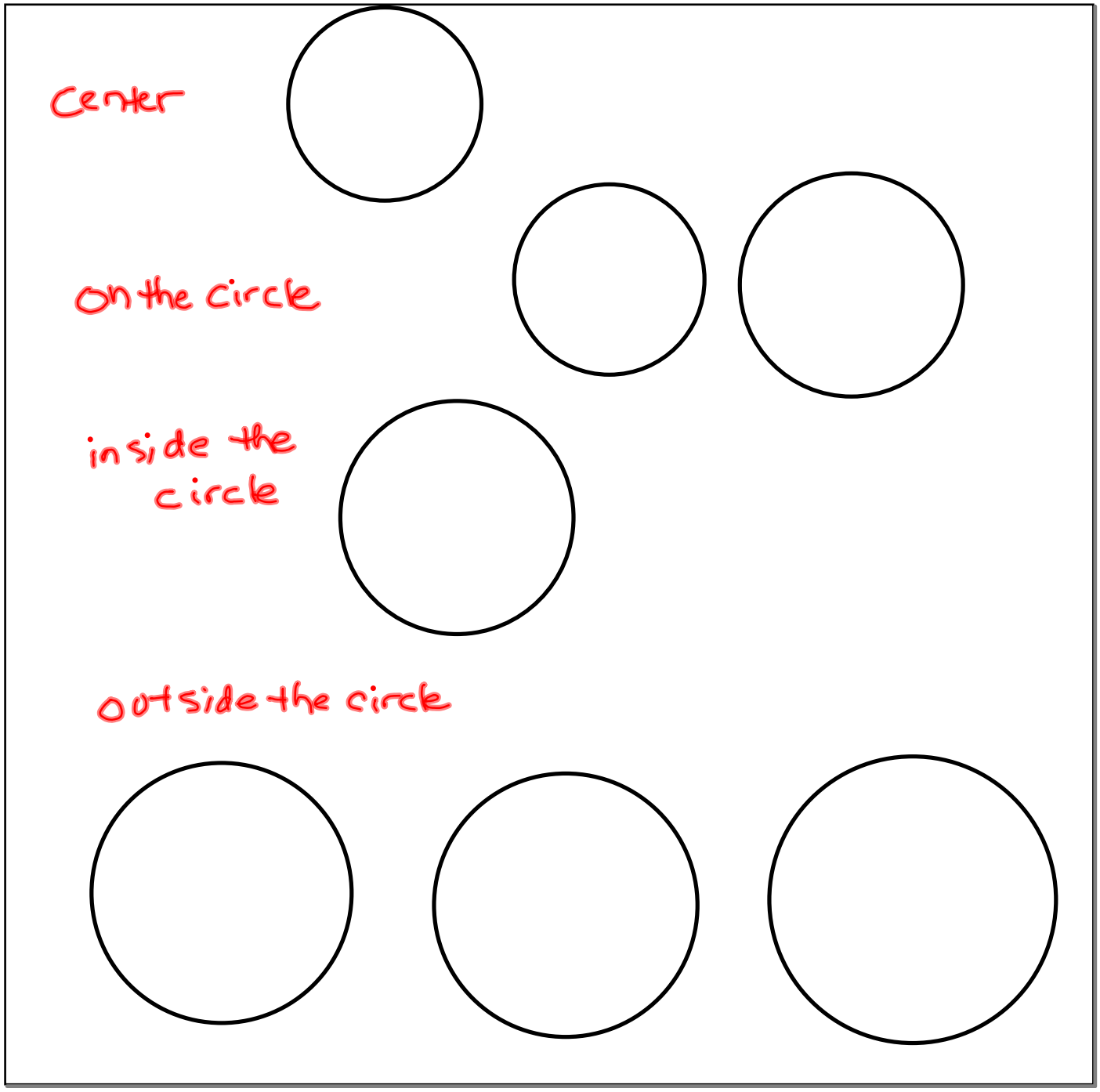
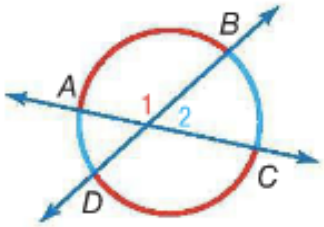
Sections 10.6




Center
on the circle
inside the circle
outside the circle

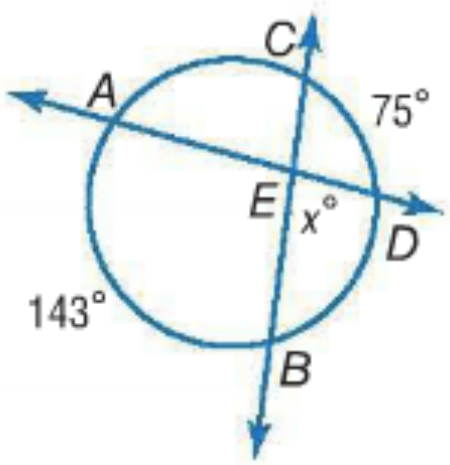
Theorem 10.12

Words If two secants or chords intersect in the interior of a circle, then the measure of an angle formed is one half the *sum* of the measure of the arcs intercepted by the angle and its vertical angle.



Example $m\angle 1 = \frac{1}{2}(m\overset{\frown}{AB} + m\overset{\frown}{CD})$ and $m\angle 2 = \frac{1}{2}(m\overset{\frown}{DA} + m\overset{\frown}{BC})$

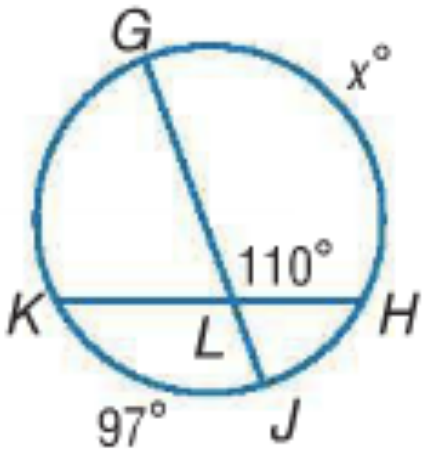
Find x.



1 Answer?

2 Answer?

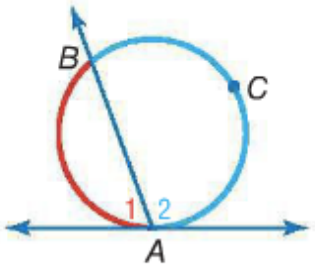
Find x.



Theorem 10.13

Words If a secant and a tangent intersect at the point of tangency, then the measure of each angle formed is one half the measure of its intercepted arc.

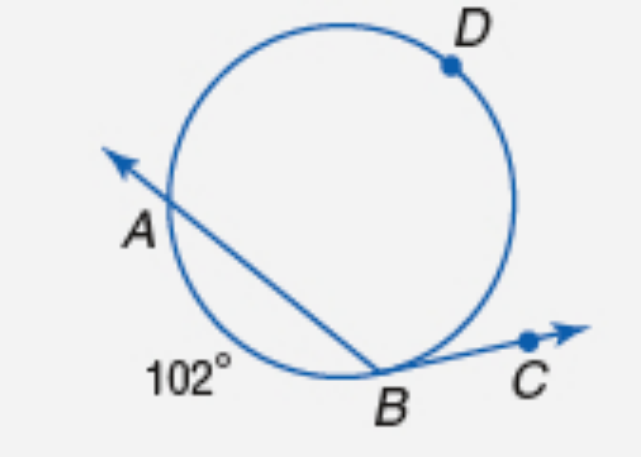
Example $m\angle 1 = \frac{1}{2}m\overset{\frown}{AB}$ and $m\angle 2 = \frac{1}{2}m\overset{\frown}{ACB}$



Example 2 Secant-Tangent Angle

Find $m\angle ABC$ if $m\overset{\frown}{AB} = 102$.

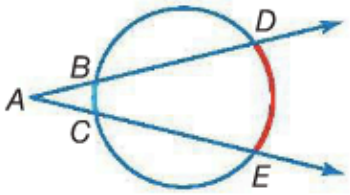
3 Answer?



Theorem 10.14

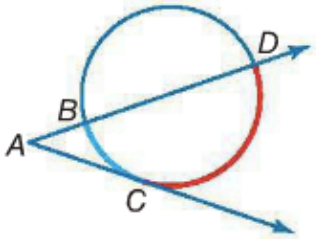
Words If two secants, a secant and a tangent, or two tangents intersect in the exterior of a circle, then the measure of the angle formed is one half the *difference* of the measures of the intercepted arcs.

Examples



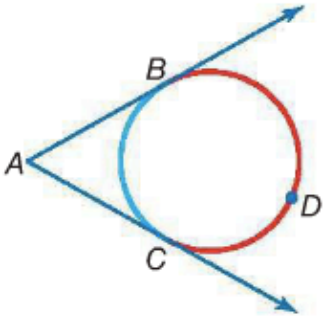
Two Secants

$m\angle A = \frac{1}{2}(m\overset{\frown}{DE} - m\overset{\frown}{BC})$



Secant-Tangent

$m\angle A = \frac{1}{2}(m\overset{\frown}{DC} - m\overset{\frown}{BC})$

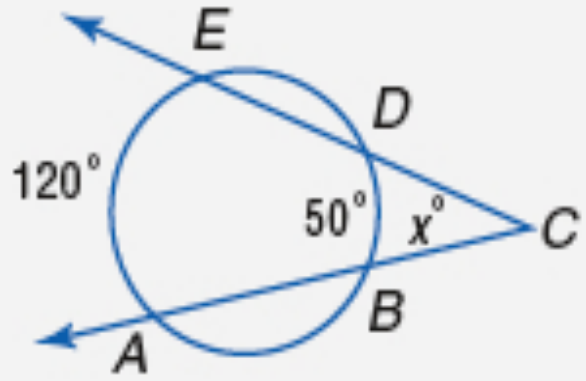


Two Tangents

$m\angle A = \frac{1}{2}(m\overset{\frown}{BDC} - m\overset{\frown}{BC})$

Example 3 Secant-Secant Angle

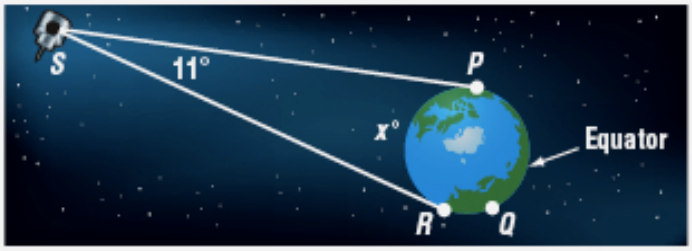
Find x.



4 Answer?

Example 4 Tangent-Tangent Angle

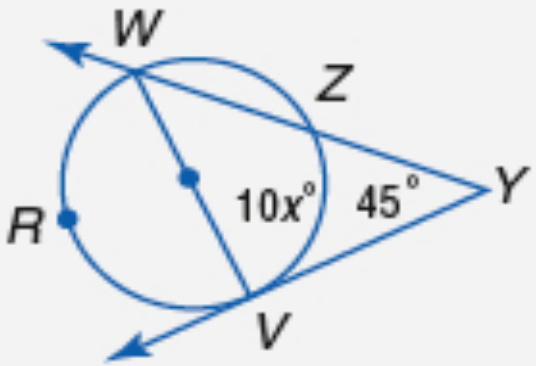
SATELLITES Suppose a geostationary satellite S orbits about 35,000 kilometers above Earth rotating so that it appears to hover directly over the equator. Use the figure to determine the arc measure on the equator visible to this geostationary satellite.



5 Answer?

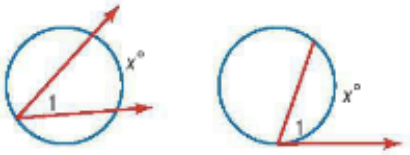
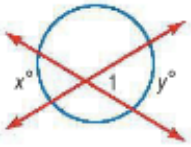
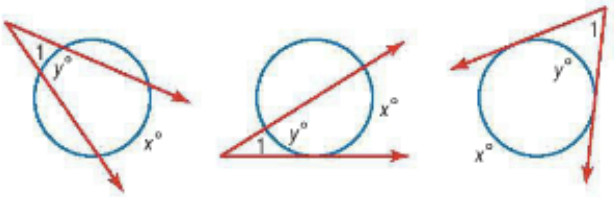
Example 5 Secant-Tangent Angle

Find x.



6 Answer?

KeyConcept Circle and Angle Relationships

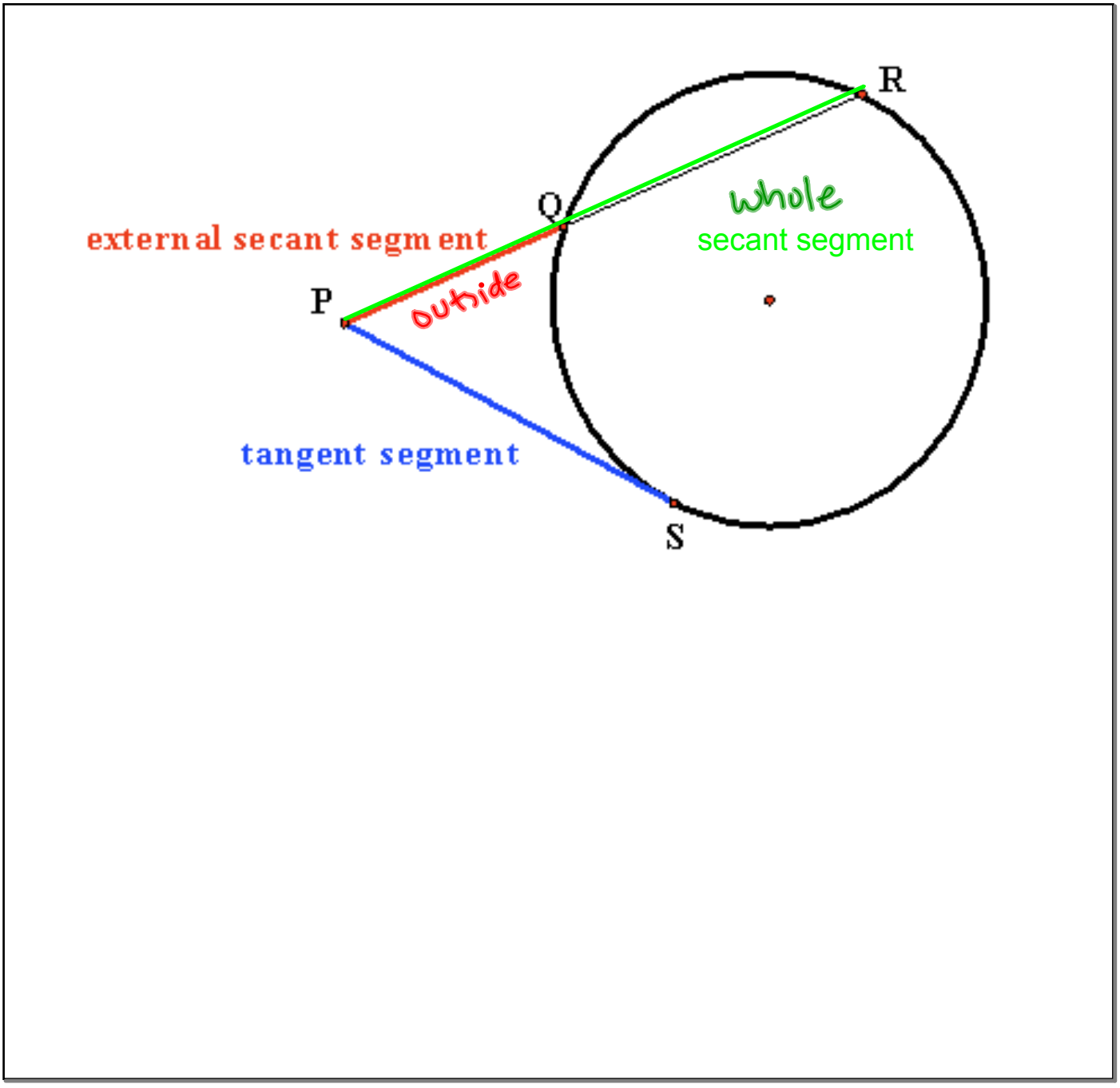
Vertex of Angle	Model(s)	Angle Measure
on the circle		one half the measure of the intercepted arc $m\angle 1 = \frac{1}{2}x$
inside the circle		one half the measure of the sum of the intercepted arc $m\angle 1 = \frac{1}{2}(x + y)$
outside the circle		one half the measure of the difference of the intercepted arcs $m\angle 1 = \frac{1}{2}(x - y)$

Section 10.7

Grade: «grade»

Subject: «subject»

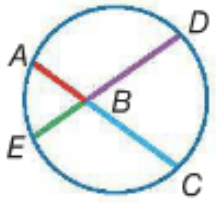
Date: «date»


R
Q
whole
secant segment
external secant segment
outside
P
tangent segment
S

Theorem 10.15 Segments of Chords Theorem

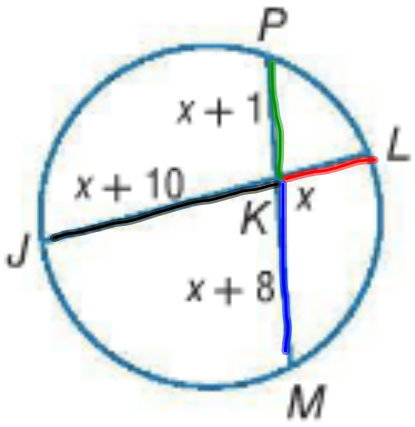
Words If two chords intersect in a circle, then the products of the lengths of the chord segments are equal.

Example $AB \cdot BC = DB \cdot BE$



Find x.

1 Answer?



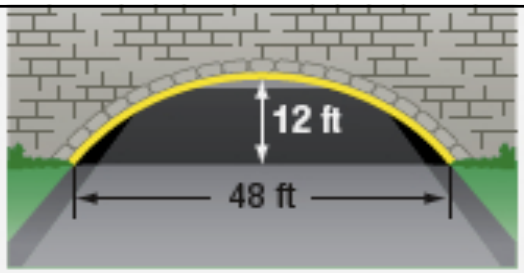
$$x(x+10) = (x+8)(x+1)$$

$$x^2 + 10x = x^2 + 9x + 8$$

$$x = 8$$

Example 2 *Solve Problems*

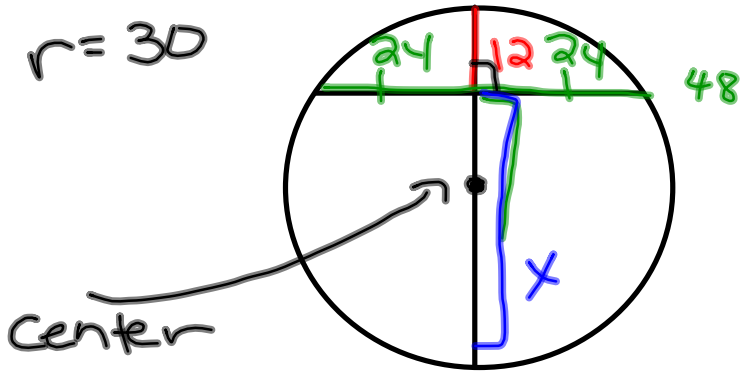
TUNNELS Tunnels are constructed to allow roadways to pass through mountains. What is the radius of the circle containing the arc if the opening is not a semicircle?



2 Answer?

$x + 12 = d = 60$

$r = 30$

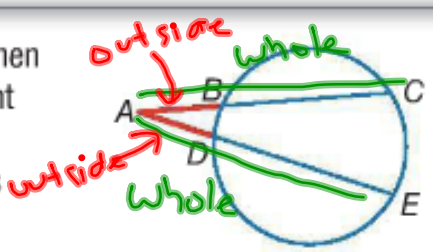


$12x = 24(24)$

$x = 48$

Theorem 10.16 Secant Segments Theorem

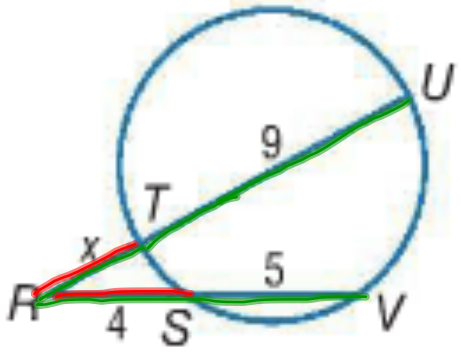
Words If two secants intersect in the exterior of a circle, then the product of the measures of one secant segment and its external secant segment is equal to the product of the measures of the other secant and its external secant segment.



Example $AC \cdot AB = AE \cdot AD$

whole x outside = whole x outside

Find x.



3 Answer?

$$x(9+x) = 9(4)$$

$$9x + x^2 = 36$$

$$x^2 + 9x - 36 = 0$$

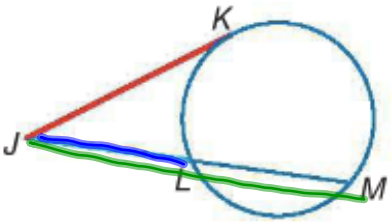
$$(x+12)(x-3) = 0$$

$x = -12 \quad x = 3$

Theorem 10.17

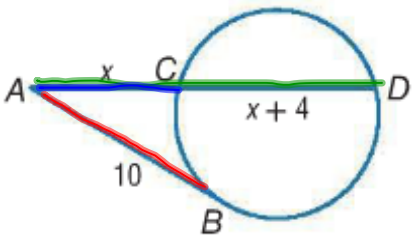
Words If a tangent and a secant intersect in the exterior of a circle, then the square of the measure of the tangent is equal to the product of the measures of the secant and its external secant segment.

Example $JK^2 = JL \cdot JM$



Whole × Outside = tangent^2

$\overline{AB}$ is tangent to the circle. Find x. Round to the nearest tenth.



4 Answer (rounded to nearest tenth)?

$x(x + x + 4) = 10^2$

$x(2x + 4) = 10^2$

$2x^2 + 4x = 100$

$2x^2 + 4x - 100 = 0$

$2(x^2 + 2x - 50) = 0$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\quad a = 1,\ b = 2,\ c = -50$

$\frac{-2 \pm \sqrt{2^2 - 4(1)(-50)}}{2(1)} = \frac{-2 \pm \sqrt{204}}{2}$

≈ 6.1